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PETROLOGICAL ABSTRACTS AND REVIEWS

EDITED BY ALBERT JOHANNSEN

Announcement.—With this number of the *Journal* a beginning is made in the publication of a series of abstracts and reviews of petrographical papers which it is hoped may be continued in each issue in the future. Whether this will be possible or not will depend largely upon the co-operation of petrologists. With the increasing number of petrographical descriptions, reading and reviewing all articles has become a work too great for one man to accomplish in his spare time, and it is necessary to ask the assistance of all petrographers who are interested in keeping these abstracts up to date. This work was begun too late to cover all the recent literature, but great interest has been shown by the few petrographers who have been consulted, and much aid has been promised for future numbers. It is hoped that authors will themselves send in short summaries of their papers, promptly upon publication, giving reference to publication, volume, etc., as in the abstracts here published. It is especially desirable that new analyses, new methods of determination, and new instruments, be fully described. Summaries and separates for abstracts may be sent to Albert Johannsen, Walker Museum, The University of Chicago.

BARBIER, PH. "Sur un caractère chimique différentiel des orthoses et des microclines," *Comptes Rendus de l'Académie des Sciences*, 1908, CXLVI, 1330.

Spectroscopic analysis of the chlorides of the bases extracted from twenty-five orthoclases and twenty microclines shows that the orthoclases invariably contain small quantities of either lithium or rubidium, or both together, while the microclines contain neither. The author concludes that orthoclase constitutes a definite species characterized by monoclinic form and the presence of small quantities of lithium and rubidium, and that it therefore can be distinguished chemically from microcline.

F. C. CALKINS

DUPARC, LOUIS. "Recherches Géologiques et Pétrographiques sur l'Oural du Nord," Pt. III: Le bassin de la Haute-Wichéra, *Mémoires de la Société de Physique et d'Histoire Naturelle de Genève*, 1909, XXXVI, fasc. 1.

Pp. 53–114 are devoted to the petrography of diabases and pre-Devonian metamorphic rocks.

The diabases are of ordinary types, essentially composed of plagioclase and augite. The optical properties of the pyroxene and its alterations are fully described.

The metamorphic rocks comprise quartzites, amphibolites with albite and epidote, albite-chlorite schists, glaucophanites with albite and epidote, sericitic albite gneiss, quartz-sericite schist, and quartzitic schist. Numerous rock analyses are given and the amphibolites are said to be derived from diabases. The optical properties of the amphiboles are described with much detail. Amphiboles related to glaucophane occur in many of the schistose rocks.

F. C. CALKINS

FINLAYSON, A. M. "Petrology and Structure of the Pyritic Field of Huelva, Spain," *Geol. Mag.*, 1109, VII, 220–29. Figs. 3, pl. I.

The pre-Cambrian rocks which occur in this area consist of gneisses, hornblende schists, crystalline and metamorphic limestones, succeeded by less altered schists and phyllites. Cambrian schists with quartzites and greywackes are conformable with the upper members of the crystalline series. Granites of varying composition occur as a series of intrusive bosses. Rhyolite, trachyte, syenite, and monzonite porphyries occur and are thought to be intrusive in agreement with Vogt and opposed to Klockman. Basic intrusions, consisting of diabases, augite porphyrites, dolerites, and augite diorites are mentioned.

ALBERT D. BROKAW

GOLFIER, J. "Recherche des paramètres qui caractérisent les types classiques de roches.éruptives," *Bull. Soc. Geol. Fr.*, 4th ser., 1908, VIII, 55–64.

The author attempts to define chemically the divisions of the current classification developed by Rosenbusch and others.

The "parameters" used for the purpose are certain especially characteristic ratios derived as follows: Let the atomic proportions of Si, K, Na, Ca, Mg, Fe, be represented by s, k, n, c, m, f. Then

$$A=\frac{k+n}{k+n+c+m+f}\times 100,\quad \text{Sa}=\frac{s}{k+n}$$

$$\text{MF}=\frac{m+f}{k+n+c+m+f}\times 100,\quad \text{Ss}=\frac{s}{k+n+c+m+f}$$

It is found that in the second edition of Rosenbusch's *Gesteinslehre* the names of analyzed rocks, with relatively few exceptions, are used in accordance with the following scheme:

	$\text{Sa}>5.5$	$\text{Sa}<5.5$ >4.15	$\text{Sa}<4.15>2.9$	$\text{Sa}<2.9$
$A>50$ Alkaline magmas	Granites		Alkali syenites	Eleolite syenites
$A<50>25$	Diorites	Normal syenites	Theralites	
$A<25$ $\text{MF}<75$ Mixed magmas	$\text{Ss}>1.1$, Gabbro		$\text{Ss}<1.1$ Shonkinites	
$\text{MF}>75$ Ferromagnesian magmas	Peridotites			

Rosenbusch's syenites are divided into "normal" and "alkali" syenites, while his essexite, theralite, and shonkinite and ijolite-missourite families fall in the "theralites" and "shonkinites" of the table.

F. C. CALKINS

HILLEBRAND. W. F. "The Analysis of Silicate and Carbonate Rocks," *Bull. U.S. Geol. Survey No. 422*, 1910. Pp. 239. Figs. 27.

A revision of *Bulletin 305*. The following are the more important changes and additions. The effect of fine grinding upon the ferrous iron content is discussed in the chapter on the preparation of the sample, and again in the chapter on the determination of ferrous iron. To minimize the error due to oxidation the sample may be ground in absolute alcohol. This apparently does not reduce ferric minerals.

The chapter on water has been rearranged and is introduced by a section on the rôle of hydrogen in minerals, in which a provisional classification of the condition of hydrogen in minerals is developed. The author advocates the weighing of the air-dry powder and determination of moisture rather than the weighing of the perfectly dried sample, as the latter takes up water on the unavoidable exposure to the air during weighing, etc.

A considerable addition is made to the chapter on the determination of titanium, with the view to minimizing the error due to the bleaching effect of alkali salts on the color produced by hydrogen peroxide.

A new indirect method for determining fluorine, devised by Steiger and modified by Merwin, is introduced. This method is based on the fact that fluorine has a powerful bleaching effect on the yellow color resulting from the oxidation of a titanium solution by means of hydrogen peroxide. Steiger's and Merwin's diagrams are introduced.

A number of alterations of minor importance have also been made.

ALBERT D. BROKAW

JOHANNSEN, ALBERT. "Some Simple Improvements for a Petrographical Microscope," *Am. Jour. Sci.*, 4th ser., 1910, XXIX, 435-38. Figs. 4.

The writer describes (1) a rotating upper nicol in which the annoying reflection of light from the surface is overcome; (2) a permanently attached combination wedge, combining a gypsum plate and a combination quartz-mica wedge in a metal casing. An indicator shows the order of the interference color appearing in the field; (3) a rotating lower nicol for observing very slight changes of pleochroism; (4) improvements to the Hirschwald stage.

ALBERT D. BROKAW

LACROIX, A. "Sur l'existence à la Côte d'Ivoire d'une série pétrographique comparable à celle de la charnockite, *Comptes Rendus de l'Academie des Sciences*, 1910, CL, 18–22.

The rocks described have a vast development in the western part of the Gold Coast territory. They range from hypersthene granite, almost wholly composed of quartz and feldspars, to a norite free from quartz and containing at least 50 per cent of hypersthene.

Four analyses are given. These illustrate the following chemical characteristics; relatively high iron and magnesia, varying inversely as SiO_2, (71.80–54.33); slight variation in soda (3.52–4.35), rapid decrease in potash (4.11–0.59) as silica decreases; relatively small variation in lime

(2.20–5.60) which is almost wholly contained in plagioclase with 21–43 percent An.

The great interest of the rocks lies in the fact that they belong to a rare family supposed by Rosenbusch to be possibly co-ordinate with the alkali and lime-alkali families. These are principally developed in three other regions: India, S. Norway, Canada, and the Adirondacks.

The magmatic relations to the harzburgites, norites, and diabases, partly hypersthene-bearing, of Guinea and Sierra-Leone are still to be determined.

An alkali granite containing a soda amphibole is found farther north surrounded by granites of non-alkaline facies.

Ordinary biotite granites are abundant about the sources of the Niger.

F. C. CALKINS

LOUGHLIN, G. F. "Intrusive Granites and Associated Metamorphic Sediments in Southwestern Rhode Island," *Am. Jour. Sci.*, 4th ser., 1910, XXIX, 447–57. Maps 2.

From his studies in southeastern Connecticut and southwestern Rhode Island, the author became convinced that all of the granites of that area are parts of one batholith, not of pre-Cambrian age, but intrusive into rocks which have been mapped as Carboniferous. In a former paper, not yet published, a detailed report was made of the Connecticut area. The present paper gives the results of a continuation of the work eastward into Rhode Island.

In the Connecticut area the granites, which the writer calls the Sterling granite series, include normal biotite granite, porphyritic biotite granite, and alaskite; the latter cutting the other two varieties. All are intrusive into the sedimentary series. In the Rhode Island area the same rocks are found, supplemented by a later intrusion, represented by the granite found at Westerly, R.I. Both the sediments and the Sterling granite are cut by dikes of the Westerly granite, which differs from the Sterling granite only in containing a higher percentage of plagioclase.

The author concludes: (1) The Westerly granite is closely related to the Sterling granite and is considered its latest exposed phase. (2) The Sterling granite batholith is continuous from eastern Connecticut to Narragansett Bay, R.I., and includes granite formerly thought to be pre-Cambrian. There are no pre-Cambrian rocks in Rhode Island south of the Washington-Kent county line. (3) The Sterling granite is intrusive into all the sediments with which it is in contact, and its intrusion accompanied metamorphism and folding. (4) The time of the intrusion is correlated with that of the Appalachian Revolution. (5) The Kingstown sediments were derived principally from felsite porphyry, micrographic granite, and possibly more basic igneous rocks.

ALBERT JOHANNSEN

NOBLE, L. F. "Contributions to the Geology of the Grand Canyon, Arizona. The Geology of the Shinumo Area, Pt. I," *Am. Jour. Sci.*, 4th ser., 1910, XXIX, 369–86.

Describes the Archean rocks (Vishnu) of the area as consisting of a complex of quartz, mica, and hornblende schists, invaded by a batholithic mass of quartz diorite and injected by veins of pegmatite and aplite. These veins are of two ages, the older being folded with the schists, while the younger cut both the schists and the quartz diorite. No attempt is made to work out the general structure of the complex on account of the limited exposures.

ALBERT D. BROKAW

PRIOR, G. T. "On an Analcite Basalt from Rathjordan, Co., Limerick," *Min. Mag.*, 1910, XV, 315–17. Figs. 2.

The rock from Rathjordan has been described by Hull and Alport. According to the latter it is a fine-grained, black basalt which consists of a groundmass of innumerable small grains of augite, magnetite, and amorphous glass, in which are pseudomorphs of altered olivine and feldspar. The present writer adds that in the supposed glassy groundmass there are also thin needles, probably apatite, and some isotropic material which, under the microscope, resembles leucite.

A small portion of this isotropic material was isolated and subjected to microscopical and chemical tests. There were strong reactions for sodium while none were obtained for potassium. He concludes, therefore, that most of the supposed leucite is probably analcite. In order to check this conclusion an analysis of the rock was made which appears as follows: SiO_2, 40.81; TiO_2, 3.86; Al_2O_3, 13.08; Fe_2O_3, 6.40; FeO, 7.20; MnO, 0.07; CaO, 10.12; MgO, 10.03; Na_2O, 2.43; K_2O, 0.31; P_2O_5, 0.88; H_2O at 110°C., 0.82; H_2O above 110°C., 3.97. The small amount of potash shown by this analysis seems to confirm the above conclusion. The rock is therefore an analcite-basalt. This analysis is compared with one of a leucite basalt from Bohemia, and one of an analcite basalt from Colorado. In the case of the latter rock, Cross argues, that judging from the freshness of the other constituents present, the analcite is probably primary. However no such an argument applies to the analcite of the Rathjordan basalt as the rock is much altered. The author suggests that possibly this rock was originally a leucite basalt and that the leucites have been subsequently altered to analcite.

CLARENCE W. RUSSELL

RANSOME, F. L., EMMONS, W. H., and GARREY, G. H. "Geology and Ore Deposits of the Bullfrog District, Nevada," *Bull. U.S. Geol. Survey, No. 407*, 1910. Pp. 130. Figs. 20, Pl. 13.

Two areas of pre-Tertiary crystalline rocks are described. The first consists of quartzite, quartz-biotite and quartz schist, grading through calcite schist into nearly pure marble. A few pegmatite veins and a larger number of quartz veins cut the schists. The schists are overlain by limestone presumed to be Silurian.

In the second area the crystalline complex consists chiefly of quartz-biotite injection schist, pegmatite, and augen gneiss. A "sheared diorite" is thought to be a dike which cut the sedimentaries previous to their metamorphism. A quartz diorite dike cuts the schists and pegmatite and with them is cut by a subsequent diorite dike.

The Tertiary volcanic rocks are described as consisting of sixteen rhyolite flows, five basalt flows, one flow of quartz latite and one of quartz basalt, two sedimentary tuffs, an intrusive rhyolite porphyry, dikes of plagioclase basalt and an intrusive leucite basanite. This rock falls into a subrang of the quantitative classification which has not been previously represented by an analysis from the United States. Five analyses of Tertiary igneous rocks of the region are included in the report.

The Introduction and the Economic Geology section are by Ransome; the General Geology section by Emmons and Garrey.

ALBERT D. BROKAW

TRAVIS, C. "On the Behavior of Crystals in Light Parallel to an Optic Axis," *Am. Jour. Sci.*, 4th ser., 1910, XXIX, 427–34. Figs. 2.

A mathematical explanation of the fact that a section of a biaxial crystal cut normal to an optic axis appears uniformly illuminated in parallel light between crossed nicols. The author concludes: (1) Interior conical refraction, in a strict sense, plays no part whatever as a cause of the phenomenon; (2) The cause is to be found in the fact that so-called parallel light has commonly a considerable divergence; (3) In any given case, the observed intensity of illumination is equal to the average intensity of that portion of the interference figure bounded by the limits of the pencil of light used.

ALBERT JOHANNSEN

WRIGHT, FRED EUGENE. "A New Ocular for Use with the Petrographic Microscope," *Am. Jour. Sci.*, 4th ser., 1910, XXIX, 415–26. Figs. 10.

A description of an ocular with which the birefringence, the optic axial angle, when one or both optic axes appear within the field of vision, and the extinction angle of a mineral in thin section may be measured.

ALBERT JOHANNSEN

WRIGHT, FRED EUGENE. "A new Petrographic Microscope," *Am. Jour. Sci.*, 4th ser., 1910, XXIX, 407–14. Figs. 4.

The author describes a new petrographic microscope, designed and constructed in the workshop of the Geophysical Laboratory at Washington, and specially adapted to the investigation of the optical properties of minute grains of artificial preparations. The principal differences between this and the usual petrographic microscopes are: (1) Both nicols revolve simultaneously, the connection between the two being a rigid bar; (2) The upper nicol always remains in the tube and the substage nicol is inserted or withdrawn on passing from ordinary light to crossed nicols; (3) The sensitive plate is inserted just below the condenser; (4) It has a simple mechanical stage; (5) The Bertrand lens is mounted in a sliding collar which permits of different magnifications of the interference figure; (6) An iris diaphragm immediately below the ocular is intended for use when observing interference figures directly by the Lasaulx method without the ocular and Bertrand lens; (7) An Abbe condenser is used, and with it a large nicol prism, or an Ahrens prism, 15 mm. edge, after the manner of the Fuess microscope No. I*a*. With this arrangement the entire condenser lens system remains in position and its upper lens need not be removed when low-power objectives are used.

ALBERT JOHANNSEN